US ARMY ELECTRONICS RESEARCH & DEVELOPMENT ACTIVITY

METEOROLOGICAL SUPPORT DIVISION

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

(12 April 1965)

BY

MARJORIE McLARDIE HOIDALE

ERDA-309

MAY 1965

WHITE SANDS MISSILE RANGE NEW MEXICO

METEOROLOGICAL SUPPORT DIVISION

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METEOROLOGICAL SUPPORT DIVISION
ENVIRONMENTAL SCIENCES DIRECTORATE
U. S. ARMY ELECTRONICS RESEARCH AND DEVELOPMENT ACTIVITY
WHITE SANDS MISSILE RANGE
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ABSTRACT

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Meteorological data gathered for the launching of Aerobee NASA 4.49 GS (S/N NASA 128-3) are presented for the National Aeronautics and Space Administration and for ballistic studies. The data appear, along with calculated ballistic data, in Appendixes A, B, C and D.

Author

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INTRODUCTION

Aerobee NASA 4.49 GS (S/N NASA 128-3) was launched by Naval Ordnance Missile Test Facility personnel, White Sands Missile Range, New Mexico, at 0748 hours MST, 12 April 1965.

Meteorological data used in conjunction with theoretical calculations to predict rocket impact were collected by the Meteorological Support Division, U. S. Army Electronics Research and Development Activity, White Sands Missile Range, New Mexico. The impact predictors for this firing were Gordon L. Dunaway and Marjorie M. Hoidale.

DISCUSSION

Wind data for the first 4,000 feet above the surface were obtained from a Double-Theodolite Wind Velocity Computer System [1]. Balloons released at the launch site were observed and tracked from a 2,000-foot baseline. Continuous angular data were transmitted from two electrically instrumented theodolites to a computer where the data were reduced to obtain a velocity-vs-height relationship. The computer output drives two recorders which trace north-south and east-west components on a specially designed wind velocity computer ballistic chart. It is possible to read directly from the chart both the mean wind component values and the mean ballistic wind components in the various ballistic layers.

Temperature, pressure and humidity data, along with upper wind data from 4,000 to approximately 75,000 feet above the surface, were obtained from standard rawinsonde operations.

Mean wind component values in each ballistic zone were determined from vertical cross sections by the equal-area method.

Data appearing in Appendix D are based on the E. L. Walter [2] theory. The "Predicted Impact" includes, where applicable, an adjustment of impact based on the experience of the impact predictor and the forecast of firing time wind conditions.

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[1]. "Double-Theodolite Wind Velocity Computer," UNCLASSIFIED, U. S. Army Signal Research and Development Laboratory, Fort Monmouth, New Jersey, July 1959.

[2]. Walter, E. L., "Six-Variable Ballistic Model for a Rocket," Missile Meteorology Division, U. S. Army Signal Missile Support Agency, White Sands Missile Range, New Mexico, June 1962.

APPENDIX A

CALCULATED ROCKET PERFORMANCE VALUES

AND

TABLE OF BALLISTIC FACTORS

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

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APPENDIX A

TABLE A-I

CALCULATED ROCKET PERFORMANCE VALUES

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

PAYLOAD 267.9 Pounds*

UNIT WIND EFFECT	Surface to 2,000 FT	2.62 Miles/MPH	(3)
	2,000 to 100,000 FT	4.72 Miles/MPH	
TOWER TILT EFFECT		19.16 Miles/Degree	
BURNOUT:			
Velocity		5,800 Feet/Second	
Altitude		128,100 Feet MSL	
Time		51.8 Seconds	
PEAK:			
Altitude		125.6 Miles MSL	
Time		241.5 Seconds	
TOTAL TIME OF FLIGHT		501.0 Seconds	
CORIOLIS EFFECT (West)		5.92 Miles	

*Includes Nosecone Weight

(3) An empirical correction has been made to the unit wind effect from 143 to 2,000 feet. This correction was determined from statistical studies.

Dunaway, G. L., "An Empirical Technique for Improving Aerobee-Hi Impact Predictions," Meteorological Support Division, U. S. Army Electronics Research and Development Activity, White Sands Missile Range, New Mexico, May 1964.

APPENDIX A

TABLE A-II

TABLE OF BALLISTIC FACTORS

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

HEIGHT INTERVAL FEET	BALLISTIC FACTOR	HEIGHT INTERVAL FEET	BALLISTIC FACTOR
143 - 200	.100	5,000 - 10,000	.078
200 - 300	.130	10,000 - 15,000	.042
300 - 400	.102	15,000 - 20,000	.030
400 - 600	.150	20,000 - 25,000	.020
600 - 800	.078	25,000 - 30,000	.017
800 - 1,000	.012	30,000 - 35,000	.010
1,000 - 1,200	.018	35,000 - 40,000	.010
1,200 - 1,400	.013	40,000 - 45,000	.006
1,400 - 1,600	.012	45,000 - 50,000	.009
1,600 - 1,800	.011	50,000 - 60,000	.010
1,800 - 2,000	.010	60,000 - 70,000	.007
2,000 - 3,000	.052	70,000 - 80,000	.006
3,000 - 4,000	.040	80,000 - 90,000	.003
4,000 - 5,000	.022	90,000 - 100,000	.002

APPENDIX B

ANEMOMETER RECORDINGS OF WIND SPEED AND DIRECTION

AND

PILOT-BALLOON-MEASURED WIND DATA FROM 143 to 4,000 FEET

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

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B-II. Pilot-Balloon-Measured Wind Data (143 to 4,000 Feet) - 9

APPENDIX B

TABLE B-I

ANEMOMETER RECORDINGS OF WIND SPEED AND DIRECTION

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

TIME (Minutes)	WIND SPEED (Knots)	DIRECTION (Degrees)
T - 15		
T - 10		
T - 5		
T - Time	Data missing due to malfunction of wind sensor.	
T + 5		
T + 10		
T + 15		

NOTE: Wind speeds and directions are 5-minute averages centered at indicated times.

APPENDIX B

TABLE B-II

PILOT-BALLOON-MEASURED WIND DATA

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

MEAN WIND COMPONENTS FOR BALLISTIC ZONES IN MILES PER HOUR

DOUBLE-THEODOLITE METHOD

RELEASE NO.	1		2		3		4	
RELEASE TIME (MST)	0407		0430		0445		0500	
LAYERS IN FEET	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
143 - 250	0.0	2.0E	0.0	1.0E	0.0	0.5E	1.0N	2.0E
250 - 400	1.0S	5.0	0.0	2.0	0.5N	1.0	2.0	4.0
400 - 600	1.0	5.0	0.5N	3.0	1.0	2.0	3.0	4.0
600 - 800	2.0	5.0	0.0	5.0	1.0	3.0	0.0	2.0
800 - 1,200	2.0	6.0	1.0S	7.0	0.0	3.0	4.0S	0.0
1,200 - 1,600	0.0	9.0	1.0	5.0	2.0S	2.0	3.0	3.0E
1,600 - 2,000	1.0S	6.0	0.5N	6.0	3.0	4.0	2.0	4.0
2,000 - 2,500	1.0	4.0	0.5	8.0	0.5	6.0	2.0	5.0
2,500 - 3,000	2.0	0.5	2.0S	7.0	1.0N	6.0	2.0	4.0
3,000 - 3,500	2.0	1.0W	4.0	4.0	0.0	2.0	2.0	2.0
3,500 - 4,000	2.0	3.0	6.0	1.0W	2.0S	0.5W	4.0	1.0

APPENDIX B

TABLE B-II (Cont)

PILOT-BALLOON-MEASURED WIND DATA

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

MEAN WIND COMPONENTS FOR BALLISTIC ZONES IN MILES PER HOUR

DOUBLE-THEODOLITE METHOD

RELEASE NO.	5		6		7		8	
RELEASE TIME (MST)	0530		0600		0630		0645	
LAYERS IN FEET	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
143 - 250	1.0N	2.0E	2.0N	2.0E	8.0N	7.0E	11.0N	7.0E
250 - 400	2.0	6.0	6.0	5.0	9.0	8.0	11.0	7.0
400 - 600	2.0	7.0	8.0	7.0	9.0	8.0	10.0	6.0
600 - 800	1.0	4.0	6.0	4.0	7.0	6.0	7.0	2.0
800 - 1,200	2.0S	1.0	0.0	1.0	3.0	3.0	2.0	0.0
1,200 - 1,600	4.0	1.0	4.0S	2.0	4.0S	0.0	3.0S	0.5W
1,600 - 2,000	5.0	1.0	5.0	1.0	8.0	0.5W	7.0	0.5
2,000 - 2,500	4.0	0.0	5.0	2.0	8.0	0.5	9.0	0.5
2,500 - 3,000	4.0	1.0W	5.0	0.0	8.0	0.0	9.0	2.0
3,000 - 3,500	4.0	2.0	4.0	3.0W	6.0	0.0	8.5	3.0
3,500 - 4,000	5.0	4.0	4.0	5.0	6.0	2.0W	10.0	3.0

APPENDIX B

TABLE B-II

PILOT-BALLOON-MEASURED WIND DATA

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

MEAN WIND COMPONENTS FOR BALLISTIC ZONES IN MILES PER HOUR

DOUBLE-THEODOLITE METHOD

RELEASE NO.	9		10		11		12	
RELEASE TIME (MST)	0700		0710		0720		0728	
LAYERS IN FEET	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
143 - 250	15.0N	9.0E	11.5N	9.0E	9.0N	1.0E	3.5N	2.0E
250 - 400	15.0	9.0	11.5	9.0	13.5	1.5	9.0	3.0
400 - 600	12.5	8.0	10.5	7.0	18.0	2.0	16.0	2.0
600 - 800	7.0	5.5	9.0	4.0	17.5	4.0	15.0	4.0
800 - 1,200	0.5	3.5	3.0	1.5	7.0	5.0	10.0	7.5
1,200 - 1,600	7.0S	0.5	4.5S	1.0W	3.0S	0.0	4.5S	3.5
1,600 - 2,000	9.5	1.0W	9.0	1.5	11.0	6.0W	13.5	2.0W
2,000 - 2,500	9.0	0.5E	10.0	1.0E	13.5	2.5E	9.0	4.0E
2,500 - 3,000	9.5	0.5	10.0	1.5	8.5	3.5	7.5	5.0
3,000 - 3,500	10.0	4.0W	10.0	1.0	9.0	2.5	11.5	0.5W
3,500 - 4,000	11.5	5.5	9.0	1.0	13.0	3.5W	15.0	5.5

APPENDIX B

TABLE B-II (Cont)

PILOT-BALLOON-MEASURED WIND DATA

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

MEAN WIND COMPONENTS FOR BALLISTIC ZONES IN MILES PER HOUR

DOUBLE-THEODOLITE METHOD

RELEASE NO.	13		14					
RELEASE TIME (MST)	0737		0750					
LAYERS IN FEET	**N-S**	**E-W**	**N-S**	**E-W**	**N-S**	**E-W**	**N-S**	**E-W**
145 - 250	4.0N	2.0E	3.0N	1.0E				
250 - 400	6.0	1.5	4.5	4.0W				
400 - 600	12.0	1.0	8.5	2.0				
600 - 800	13.5	2.5	12.0	1.5E				
800 - 1,200	3.5	3.5	5.0	1.0W				
1,200 - 1,600	4.0S	3.0	7.0S	1.5E				
1,600 - 2,000	13.5	2.0W	12.5	2.0W				
2,000 - 2,500	12.0	1.0E	10.5	2.0E				
2,500 - 3,000	12.5	4.0	12.0	4.5				
3,000 - 3,500	13.0	2.5	15.0	4.5				
3,500 - 4,000	17.5	2.0W	11.5	9.0				

APPENDIX C

TABLES OF UPPER AIR DATA

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

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APPENDIX C

TABLE C-I

UPPER AIR DATA

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

MEAN WIND COMPONENTS FOR BALLISTIC ZONES IN KNOTS

RELEASE NO.	1	
RELEASE TIME (MST)	0630	
LAYERS IN FEET	W-S	E-W
4,000 - 5,000	8.5S	5.0W
5,000 - 10,000	19.0	11.0
10,000 - 15,000	27.5	16.0
15,000 - 20,000	34.0	40.5

APPENDIX C

TABLE C-II

UPPER AIR DATA

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

MEAN WIND COMPONENTS FOR BALLISTIC ZONES IN KNOTS

RELEASE NO.	1*		2		3	
RELEASE TIME (MST)	0200		0400		0730	
LAYERS IN FEET	N-S	E-W	N-S	E-W	N-S	E-W
4,000 - 5,000	6.0S	10.5W	7.5S	6.5W	15.0S	1.0W
5,000 - 10,000	19.0	16.0	18.5	15.5	23.0	11.5
10,000 - 15,000	27.5	23.0	30.5	17.5	29.0	16.5
15,000 - 20,000	35.0	29.5	31.0	37.5	35.0	40.0
20,000 - 25,000	48.0	58.0	46.0	55.0	45.0	59.0
25,000 - 30,000	44.0	76.0	54.0	64.0	53.0	64.0
30,000 - 35,000	43.0	74.0	41.5	72.0	60.0	67.0
35,000 - 40,000	43.0	74.0	38.5	66.5	48.0	63.0
40,000 - 45,000	30.0	52.0	32.5	56.0	31.0	54.0
45,000 - 50,000	31.0	54.0	22.5	27.0	30.0	44.5
50,000 - 60,000	27.0	32.0	6.0W	34.5	19.5	14.0
60,000 - 70,000	12.0	7.0E	10.0S	8.5	0.0	13.0E
70,000 - 80,000	17.0	0.0	6.5	7.5	Balloon Burst	
80,000 - 90,000	7.5	12.0W	5.0	8.5		
90,000 - 100,000	7.5	12.0	3.5	19.5		

*Telecompute data not available.

STATION ALTITUDE 3989.0 FEET MSL
12 APR. 65 0400 HRS MST
ASCENSION NO. 289

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

TABLE C-III. UPPER AIR DATA - WHITE SANDS SITE

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT DEGREES CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
3989.0	874.8	6.3	-8.8	33.0	1089.2	651.4	0.	0.	1.000258
5000.0	843.2	15.3	-5.2	24.0	1016.8	661.9	325.2	0.4	1.000245
5500.0	828.2	14.1	-6.0	24.3	1002.7	660.5	308.0	0.6	1.000241
6000.0	813.3	12.9	-6.8	24.7	988.8	659.2	290.5	0.8	1.000237
6500.0	798.7	11.8	-7.6	25.0	975.1	657.8	267.5	3.3	1.000233
7000.0	784.2	10.6	-8.5	25.3	961.5	656.4	248.4	5.8	1.000229
7500.0	770.0	9.4	-9.3	25.6	948.0	655.0	243.2	8.3	1.000226
8000.0	755.9	8.2	-10.2	25.9	934.7	653.6	237.8	11.0	1.000222
8500.0	742.1	7.0	-11.1	26.2	921.5	652.2	231.1	13.8	1.000218
9000.0	728.4	5.9	-12.0	26.6	908.5	650.8	225.6	16.8	1.000214
9500.0	715.0	4.7	-12.8	26.9	895.7	649.4	223.8	20.2	1.000211
10000.0	701.7	3.7	-14.1	26.0	882.0	648.3	221.1	23.4	1.000207
10500.0	688.7	3.0	-15.5	24.4	868.1	647.4	217.9	26.4	1.000203
11000.0	675.8	2.2	-16.9	22.8	854.3	646.4	216.2	28.0	1.000198
11500.0	663.2	1.5	-18.5	21.2	840.7	645.5	214.7	29.3	1.000194
12000.0	650.7	0.3	-19.1	21.7	828.4	644.2	213.6	29.9	1.000191
12500.0	638.5	-0.9	-19.8	22.5	816.4	642.7	213.1	30.3	1.000188
13000.0	626.4	-2.1	-20.4	23.3	804.6	641.3	213.7	30.5	1.000185
13500.0	614.5	-3.3	-21.0	24.0	792.8	639.9	214.7	31.0	1.000183
14000.0	602.7	-4.5	-21.7	24.8	781.2	638.4	216.2	32.0	1.000180
14500.0	591.2	-5.7	-22.4	25.6	769.8	636.9	216.5	32.7	1.000177
15000.0	579.8	-7.0	-23.2	26.4	758.5	635.5	216.6	33.4	1.000174
15500.0	568.6	-8.2	-23.9	27.2	747.3	634.0	216.6	34.0	1.000171
16000.0	557.5	-9.5	-24.7	28.0	736.2	632.5	216.8	34.7	1.000169
16500.0	546.6	-10.7	-25.4	28.8	725.3	631.0	217.1	35.4	1.000166
17000.0	535.9	-12.2	-27.1	27.9	715.1	629.2	217.5	36.2	1.000163
17500.0	525.3	-13.8	-29.0	26.5	705.3	627.2	218.0	37.3	1.000160
18000.0	514.8	-15.4	-31.0	25.1	695.6	625.3	219.0	40.7	1.000158
18500.0	504.5	-16.9	-31.7	26.6	685.7	623.4	219.6	41.9	1.000155
19000.0	494.4	-18.4	-32.4	28.4	675.9	621.6	219.9	41.2	1.000153
19500.0	484.4	-19.9	-33.1	30.1	666.1	619.8	220.1	40.8	1.000151
20000.0	474.5	-21.4	-33.8	31.9	656.5	617.9	220.7	40.7	1.000148
20500.0	464.8	-22.9	-34.6	33.7	647.0	616.0	221.6	41.1	1.000146

STATION ALTITUDE 3989.0 FEET MSL
12 APR. 65 0400 HRS MST
ASCENSION NO. 289

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

TABLE C-III. UPPER AIR DATA - WHITE SANDS SITE (Cont)

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT DEGREES CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
21000.0	455.3	-24.0	-35.6	33.9	636.5	614.7	223.3	43.6	1.000144
21500.0	445.9	-24.1	-36.9	29.9	623.6	614.6	225.2	46.6	1.000140
22000.0	436.7	-24.2	-38.3	26.0	611.0	614.5	226.3	50.3	1.000137
22500.0	427.7	-24.3	-40.0	22.1	598.6	614.3	227.5	53.8	1.000134
23000.0	418.8	-24.7	-41.7	19.2	587.2	613.8	228.9	57.0	1.000132
23500.0	410.2	-25.5	-43.3	17.4	577.0	612.8	230.2	60.9	1.000129
24000.0	401.6	-26.5	-44.2	17.3	567.3	611.6	231.5	65.2	1.000127
24500.0	393.3	-27.5	-44.9	17.6	557.8	610.3	232.7	65.9	1.000125
25000.0	385.0	-28.6	-45.6	18.0	548.5	608.9	234.0	65.3	1.000123
25500.0	376.9	-29.7	-46.3	18.4	539.3	607.6	234.1	71.1	1.000121
26000.0	369.0	-30.7	-47.1	18.7	530.3	606.3	234.0	77.7	1.000119
26500.0	361.1	-31.8	-47.8	19.1	521.3	604.9	234.2	78.0	1.000117
27000.0	353.4	-32.9	-48.6	19.5	512.5	603.6	234.3	79.2	1.000115
27500.0	345.9	-34.0	-49.3	19.9	503.8	602.2	233.9	83.8	1.000113
28000.0	338.4	-35.1	-50.8	18.8**	495.4	600.7	233.7	85.4	1.000111
28500.0	331.1	-36.3	-52.7	16.9**	487.1	599.2	233.9	82.6	1.000109
29000.0	323.9	-37.6	-54.8	15.0**	479.0	597.7	234.0	82.1	1.000107
29500.0	316.8	-38.8	-56.9	13.0**	471.0	596.1	234.0	83.5	1.000105
30000.0	309.9	-40.0	-59.2	11.1**	463.1	594.6	234.2	84.6	1.000103
30500.0	303.1	-41.2	-61.7	9.2**	455.3	593.0	234.5	85.6	1.000101
31000.0	296.3	-42.5	-64.5	7.2**	447.6	591.4	234.8	85.8	1.000100
31500.0	289.7	-43.7	-67.7	5.2**	440.0	589.8	235.1	85.9	1.000098
32000.0	283.2	-45.0	-72.0	3.2**	432.5	588.2	235.1	85.0	1.000096
32500.0	276.9	-46.2	-79.1	1.2**	425.1	586.6	235.1	84.2	1.000095
33000.0	270.6	-47.4	0.	-0. **	417.6	585.0	235.0	84.8	1.000093
33500.0	264.4	-48.5	0.	-0. **	410.1	583.6	235.0	86.6	1.000091
34000.0	258.4	-49.6	0.	-0. **	402.6	582.2	235.1	91.5	1.000090
34500.0	252.4	-50.7	0.	-0. **	395.3	580.8	235.4	96.0	1.000088
35000.0	246.6	-51.8	0.	-0. **	388.1	579.4	235.7	100.2	1.000086
35500.0	240.9	-52.9	0.	-0. **	381.0	577.9	236.3	100.5	1.000085
36000.0	235.3	-54.0	0.	-0. **	374.0	576.5	237.0	97.9	1.000083
36500.0	229.7	-55.1	0.	-0. **	367.1	575.0	238.0	93.2	1.000082
37000.0	224.3	-56.2	0.	-0. **	360.3	573.5	239.1	87.1	1.000080

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E 488,580 FEET
N 185,045 FEET

TABLE C-III. UPPER AIR DATA - WHITE SANDS SITE (Cont)

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
37500.0	219.0	-57.3	0.	-0. **	353.6	572.0	240.1	83.1	1.000079
38000.0	213.8	-58.4	0.	-0. **	346.8	570.7	241.0	80.3	1.000077
38500.0	208.7	-59.0	0.	-0. **	339.6	569.7	241.0	80.8	1.000076
39000.0	203.7	-59.6	0.	-0. **	332.3	569.1	240.5	82.8	1.000074
39500.0	198.8	-57.7	0.	-0. **	321.6	571.5	239.6	84.6	1.000072
40000.0	194.1	-58.0	0.	-0. **	314.3	571.2	238.4	86.3	1.000070
40500.0	189.5	-58.2	0.	-0. **	307.1	570.9	237.5	84.6	1.000068
41000.0	185.0	-58.4	0.	-0. **	300.1	570.7	236.6	82.4	1.000067
41500.0	180.6	-58.6	0.	-0. **	293.2	570.4	236.1	79.6	1.000065
42000.0	176.3	-58.8	0.	-0. **	286.5	570.1	235.6	76.9	1.000064
42500.0	172.1	-59.0	0.	-0. **	279.9	569.9	235.7	73.8	1.000062
43000.0	167.9	-59.2	0.	-0. **	273.4	569.6	235.7	70.7	1.000061
43500.0	163.9	-59.4	0.	-0. **	267.2	569.3	235.6	68.9	1.000059
44000.0	160.0	-59.6	0.	-0. **	261.0	569.0	235.6	67.2	1.000058
44500.0	156.2	-59.8	0.	-0. **	255.0	568.8	235.1	65.0	1.000057
45000.0	152.4	-60.2	0.	-0. **	249.4	568.2	234.6	62.6	1.000056
45500.0	148.7	-60.9	0.	-0. **	244.2	567.2	234.2	60.5	1.000054
46000.0	145.1	-61.7	0.	-0. **	239.1	566.3	233.9	58.5	1.000053
46500.0	141.6	-62.3	0.	-0. **	234.0	565.4	234.2	58.4	1.000052
47000.0	138.2	-62.4	0.	-0. **	228.4	565.3	234.8	59.3	1.000051
47500.0	134.8	-62.5	0.	-0. **	223.0	565.2	236.0	62.2	1.000050
48000.0	131.6	-62.6	0.	-0. **	217.7	565.1	237.2	65.9	1.000048
48500.0	128.4	-62.6	0.	-0. **	212.5	564.9	237.9	68.0	1.000047
49000.0	125.2	-62.7	0.	-0. **	207.4	564.8	238.5	69.9	1.000046
49500.0	122.2	-62.8	0.	-0. **	202.4	564.7	238.7	70.4	1.000045
50000.0	119.2	-62.9	0.	-0. **	197.6	564.6	238.8	70.6	1.000044
50500.0	116.3	-63.0	0.	-0. **	192.9	564.5	238.7	69.2	1.000043
51000.0	113.5	-64.1	0.	-0. **	189.2	562.9	238.4	66.7	1.000042
51500.0	110.7	-65.4	0.	-0. **	185.7	561.2	237.7	63.3	1.000041
52000.0	108.0	-66.7	0.	-0. **	182.2	559.4	236.3	58.5	1.000041
52500.0	105.3	-67.7	0.	-0. **	178.6	558.1	234.5	53.0	1.000040
53000.0	102.7	-67.8	0.	-0. **	174.2	558.0	231.3	45.3	1.000039
53500.0	100.1	-68.3	0.	-0. **	170.3	557.3	227.7	37.9	1.000038

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GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
70500.0	43.1	-59.4	0.	-0. **	70.3	569.3	148.8	7.5	1.000016
71000.0	42.1	-59.3	0.	-0. **	68.6	569.4	129.3	7.3	1.000015
71500.0	41.1	-59.2	0.	-0. **	66.9	569.5	110.0	7.2	1.000015
72000.0	40.1	-59.1	0.	-0. **	65.3	569.6	94.1	10.2	1.000015
72500.0	39.1	-59.1	0.	-0. **	63.7	569.7	78.3	13.2	1.000014
73000.0	38.2	-59.0	0.	-0. **	62.2	569.8	69.0	15.6	1.000014
73500.0	37.3	-58.9	0.	-0. **	60.7	569.9	77.6	15.9	1.000014
74000.0	36.4	-58.8	0.	-0. **	59.2	570.1	86.2	16.3	1.000013
74500.0	35.5	-58.7	0.	-0. **	57.8	570.2	104.9	16.8	1.000013
75000.0	34.7	-58.7	0.	-0. **	56.4	570.3	135.2	17.5	1.000013
75500.0	33.9	-58.5	0.	-0. **	55.0	570.4	165.5	18.2	1.000012
76000.0	33.1	-58.2	0.	-0. **	53.6	570.9	182.0	21.0	1.000012
76500.0	32.3	-57.8	0.	-0. **	52.2	571.4	191.0	25.0	1.000012
77000.0	31.5	-57.4	0.	-0. **	50.9	572.0	200.0	28.9	1.000011
77500.0	30.8	-57.0	0.	-0. **	49.6	572.5	203.8	25.4	1.000011
78000.0	30.0	-56.6	0.	-0. **	48.4	573.0	206.4	20.1	1.000011
78500.0	29.3	-56.2	0.	-0. **	47.1	573.5	208.9	14.9	1.000010
79000.0	28.7	-55.9	0.	-0. **	45.9	574.0	157.6	10.8	1.000010
79500.0	28.0	-55.5	0.	-0. **	44.8	574.5	103.4	6.8	1.000010
80000.0	27.3	-55.1	0.	-0. **	43.7	575.0	52.8	3.1	1.000010
80500.0	26.7	-54.7	0.	-0. **	42.6	575.5	110.3	6.3	1.000009
81000.0	26.1	-54.4	0.	-0. **	41.5	576.0	167.8	9.5	1.000009
81500.0	25.5	-54.0	0.	-0. **	40.5	576.5	222.5	12.7	1.000009
82000.0	24.9	-53.6	0.	-0. **	39.5	577.0	225.3	15.0	1.000009
82500.0	24.3	-53.2	0.	-0. **	38.5	577.4	228.2	17.3	1.000009
83000.0	23.7	-52.8	0.	-0. **	37.5	577.9	231.7	19.2	1.000008
83500.0	23.2	-52.5	0.	-0. **	36.6	578.4	246.3	13.6	1.000008
84000.0	22.6	-52.1	0.	-0. **	35.7	578.9	260.9	7.9	1.000008
84500.0	22.1	-51.7	0.	-0. **	34.8	579.4	276.6	2.7	1.000008
85000.0	21.6	-51.4	0.	-0. **	33.9	579.9	310.2	4.0	1.000008
85500.0	21.1	-51.0	0.	-0. **	33.1	580.4	343.8	5.3	1.000007
86000.0	20.6	-50.9	0.	-0. **	32.3	580.4	14.4	6.5	1.000007
86500.0	20.2	-51.0	0.	-0. **	31.6	580.4	338.4	5.4	1.000007

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TABLE C-III. UPPER AIR DATA - WHITE SANDS SITE (Cont)

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT DEGREES CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
54000.0	97.6	-68.8	0.	-0. **	166.4	556.6	222.5	31.8	1.000037
54500.0	95.2	-69.4	0.	-0. **	162.7	555.9	217.5	26.1	1.000036
55000.0	92.8	-69.9	0.	-0. **	159.0	555.1	214.5	22.8	1.000035
55500.0	90.4	-70.2	0.	-0. **	155.2	554.8	211.7	19.5	1.000035
56000.0	88.2	-69.6	0.	-0. **	150.9	555.6	214.6	18.0	1.000034
56500.0	86.0	-69.0	0.	-0. **	146.7	556.4	217.6	16.6	1.000033
57000.0	83.8	-68.4	0.	-0. **	142.6	557.2	224.3	18.4	1.000032
57500.0	81.7	-67.8	0.	-0. **	138.6	558.0	231.5	20.6	1.000031
58000.0	79.7	-67.2	0.	-0. **	134.8	558.8	234.9	26.2	1.000030
58500.0	77.7	-66.6	0.	-0. **	131.1	559.6	236.9	33.0	1.000029
59000.0	75.8	-66.0	0.	-0. **	127.5	560.4	238.2	38.4	1.000028
59500.0	73.9	-65.4	0.	-0. **	124.0	561.2	238.3	41.9	1.000028
60000.0	72.1	-64.8	0.	-0. **	120.6	562.0	238.6	44.7	1.000027
60500.0	70.3	-65.0	0.	-0. **	117.8	561.7	240.0	36.1	1.000026
61000.0	68.6	-65.3	0.	-0. **	115.0	561.4	241.4	27.5	1.000026
61500.0	66.9	-65.6	0.	-0. **	112.3	561.0	280.5	18.5	1.000025
62000.0	65.3	-65.2	0.	-0. **	109.4	561.6	340.2	9.3	1.000024
62500.0	63.7	-63.9	0.	-0. **	106.1	563.2	23.3	4.6	1.000024
63000.0	62.1	-62.7	0.	-0. **	102.9	564.8	37.6	7.7	1.000023
63500.0	60.6	-61.9	0.	-0. **	100.0	565.9	58.6	9.2	1.000022
64000.0	59.2	-62.4	0.	-0. **	97.8	565.3	102.2	4.9	1.000022
64500.0	57.7	-62.9	0.	-0. **	95.7	564.6	143.3	1.1	1.000021
65000.0	56.3	-63.4	0.	-0. **	93.6	563.9	155.4	2.0	1.000021
65500.0	55.0	-62.8	0.	-0. **	91.0	564.8	167.4	3.0	1.000020
66000.0	53.6	-61.8	0.	-0. **	88.4	566.0	136.0	5.5	1.000020
66500.0	52.3	-60.9	0.	-0. **	85.9	567.3	100.1	8.2	1.000019
67000.0	51.1	-60.0	0.	-0. **	83.5	568.5	91.5	9.0	1.000019
67500.0	49.9	-59.8	0.	-0. **	81.4	568.7	98.3	8.7	1.000018
68000.0	48.7	-59.7	0.	-0. **	79.4	568.8	107.1	8.4	1.000018
68500.0	47.5	-59.7	0.	-0. **	77.5	568.9	120.8	7.8	1.000017
69000.0	46.4	-59.6	0.	-0. **	75.6	569.0	134.4	7.2	1.000017
69500.0	45.3	-59.5	0.	-0. **	73.8	569.1	144.9	7.3	1.000016
70000.0	44.2	-59.4	0.	-0. **	72.0	569.2	155.1	7.5	1.000016

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TABLE C-III. UPPER AIR DATA - WHITE SANDS SITE (Cont)

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
87000.0	19.7	-51.0	0.	-0. **	30.9	580.3	302.4	4.3	1.000007
87500.0	19.2	-51.1	0.	-0. **	30.2	580.3	266.3	3.3	1.000007
88000.0	18.8	-51.0	0.	-0. **	29.5	580.4	254.8	6.1	1.000007
88500.0	18.4	-50.7	0.	-0. **	28.8	580.7	243.3	8.9	1.000006
89000.0	17.9	-50.4	0.	-0. **	28.1	581.1	231.9	11.7	1.000006
89500.0	17.5	-50.2	0.	-0. **	27.4	581.5	231.0	10.2	1.000006
90000.0	17.1	-49.9	0.	-0. **	26.7	581.8	231.0	8.3	1.000006
90500.0	16.7	-49.6	0.	-0. **	26.1	582.2	231.0	6.4	1.000006
91000.0	16.4	-49.3	0.	-0. **	25.5	582.5	244.7	5.7	1.000006
91500.0	16.0	-49.1	0.	-0. **	24.9	582.9	261.1	5.3	1.000006
92000.0	15.6	-48.8	0.	-0. **	24.3	583.2	277.5	4.8	1.000005
92500.0	15.3	-48.5	0.	-0. **	23.7	583.6	280.0	6.5	1.000005
93000.0	14.9	-48.3	0.	-0. **	23.1	583.9	270.2	9.9	1.000005
93500.0	14.6	-48.0	0.	-0. **	22.6	584.3	260.5	13.4	1.000005
94000.0	14.3	-47.7	0.	-0. **	22.0	584.6	250.7	16.8	1.000005
94500.0	13.9	-47.5	0.	-0. **	21.5	585.0	251.9	18.7	1.000005
95000.0	13.6	-47.2	0.	-0. **	21.0	585.3	253.1	20.5	1.000005
95500.0	13.3	-46.9	0.	-0. **	20.5	585.7	254.4	22.4	1.000005
96000.0	13.0	-46.7	0.	-0. **	20.0	586.0	255.5	23.1	1.000004
96500.0	12.7	-46.4	0.	-0. **	19.5	586.4	256.4	22.4	1.000004
97000.0	12.4	-46.1	0.	-0. **	19.1	586.7	257.3	21.8	1.000004
97500.0	12.2	-45.9	0.	-0. **	18.6	587.0	258.2	21.1	1.000004
98000.0	11.9	-45.3	0.	-0. **	18.2	587.7	259.4	21.2	1.000004
98500.0	11.6	-44.4	0.	-0. **	17.7	588.9	260.7	21.5	1.000004
99000.0	11.4	-43.6	0.	-0. **	17.2	590.0	262.0	21.7	1.000004
99500.0	11.1	-42.7	0.	-0. **	16.8	591.1	264.6	21.7	1.000004
100000.0	10.9	-41.8	0.	-0. **	16.4	592.2	271.3	20.8	1.000004
100500.0	10.6	-40.9	0.	-0. **	15.9	593.3	278.0	19.9	1.000004
101000.0	10.4	-40.1	0.	-0. **	15.5	594.4	284.7	19.0	1.000003
101500.0	10.2	-39.2	0.	-0. **	15.1	595.5	285.0	20.1	1.000003
102000.0	9.9	-38.6	0.	-0. **	14.8	596.3	280.1	22.8	1.000003
102500.0	9.7	-38.6	0.	-0. **	14.4	596.4	275.1	25.5	1.000003
103000.0	9.5	-38.6	0.	-0. **	14.1	596.4	270.2	28.2	1.000003

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TABLE C-III. UPPER AIR DATA - WHITE SANDS SITE (Cont)

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
103500.0	9.3	-38.5	0.	-0. **	13.8	596.4	272.0	27.4	1.000003
104000.0	9.1	-38.5	0.	-0. **	13.5	596.5	275.0	26.0	1.000003
104500.0	8.9	-38.5	0.	-0. **	13.2	596.5	278.0	24.6	1.000003
105000.0	8.7	-38.5	0.	-0. **	12.9	596.5	280.2	23.2	1.000003
105500.0	8.5	-38.4	0.	-0. **	12.7	596.5	277.5	22.1	1.000003
106000.0	8.3	-38.4	0.	-0. **	12.4	596.6	274.7	20.9	1.000003
106500.0	8.2	-38.4	0.	-0. **	12.1	596.6	271.9	19.8	1.000003
107000.0	8.0	-38.4	0.	-0. **	11.8	596.6	270.4	18.4	1.000003
107500.0	7.8	-38.4	0.	-0. **	11.6	596.6	270.7	16.6	1.000003
108000.0	7.6	-38.3	0.	-0. **	11.3	596.7	271.0	14.9	1.000003
108500.0	7.5	-38.3	0.	-0. **	11.1	596.7	271.3	13.1	1.000002
109000.0	7.3	-38.3	0.	-0. **	10.8	596.7	268.9	12.8	1.000002
109500.0	7.2	-38.3	0.	-0. **	10.6	596.8	265.3	13.2	1.000002
110000.0	7.0	-38.3	0.	-0. **	10.4	596.8	261.6	13.6	1.000002
110500.0	6.8	-38.2	0.	-0. **	10.2	596.8	257.9	14.0	1.000002
111000.0	6.7	-38.2	0.	-0. **	9.9	596.8			1.000002
111500.0	6.6	-38.2	0.	-0. **	9.7	596.9			1.000002
112000.0	6.4	-38.2	0.	-0. **	9.5	596.9			1.000002
112500.0	6.3	-38.1	0.	-0. **	9.3	596.9			1.000002
113000.0	6.1	-38.1	0.	-0. **	9.1	596.9			1.000002
113500.0	6.0	-38.1	0.	-0. **	8.9	597.0			1.000002

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE OF ZERO WAS USED IN THE INTERPOLATION.

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E 488,580 FEET
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TABLE D-ET. UPPER AIR DATA - WHITE SANDS SITE

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
3989.0	877.5	9.5	-7.2	30.0	1080.0	655.1	204.0	4.1	1.000257
5000.0	845.7	12.1	-10.8	19.0	1031.6	658.1	186.4	5.7	1.000242
5500.0	830.5	12.7	-10.4	19.0	1011.0	658.7	177.7	6.5	1.000238
6000.0	815.5	12.7	-10.7	18.5	992.9	658.7	169.0	7.3	1.000234
6500.0	800.8	12.3	-11.2	18.2	976.3	658.3	161.1	8.1	1.000230
7000.0	786.4	11.0	-11.4	19.7	963.1	656.7	169.5	9.8	1.000227
7500.0	772.1	9.6	-11.6	21.2	950.1	655.2	177.2	11.4	1.000224
8000.0	758.0	8.3	-11.9	22.6	937.3	653.6	179.8	13.0	1.000221
8500.0	744.1	6.9	-12.2	24.1	924.6	652.0	183.9	14.8	1.000218
9000.0	730.4	5.6	-12.6	25.6	912.0	650.5	191.3	17.2	1.000214
9500.0	716.9	4.2	-13.1	27.1	899.5	648.9	197.1	19.6	1.000211
10000.0	703.6	2.8	-13.6	28.7	887.2	647.2	201.5	22.1	1.000208
10500.0	690.5	1.5	-14.2	30.2	875.1	645.6	207.5	24.4	1.000205
11000.0	677.5	0.1	-14.8	31.7	863.0	644.0	214.0	26.7	1.000202
11500.0	664.7	-0.6	-16.5	28.9	849.0	643.1	214.3	27.2	1.000198
12000.0	652.1	-1.2	-18.7	25.1	834.7	642.4	213.7	27.5	1.000193
12500.0	639.8	-1.7	-21.0	21.3	820.6	641.8	210.2	27.4	1.000189
13000.0	627.7	-2.2	-23.7	17.5	806.8	641.1	206.3	27.3	1.000184
13500.0	615.7	-3.3	-24.8	17.3	794.5	639.8	201.7	27.5	1.000181
14000.0	604.0	-4.4	-25.5	17.6	782.7	638.5	197.1	27.8	1.000178
14500.0	592.4	-5.6	-26.3	17.9	771.0	637.1	197.1	28.3	1.000176
15000.0	581.0	-6.7	-27.0	18.2	759.5	635.7	197.8	28.8	1.000173
15500.0	569.7	-7.9	-27.8	18.5	748.0	634.3	201.3	29.6	1.000170
16000.0	558.7	-9.1	-28.6	18.9	736.8	632.9	205.1	30.5	1.000167
16500.0	547.8	-10.2	-29.4	19.2	725.6	631.5	209.2	31.6	1.000165
17000.0	537.0	-11.4	-30.2	19.5	714.6	630.1	213.3	32.7	1.000162
17500.0	526.5	-12.6	-31.1	19.8	703.7	628.6	216.8	34.9	1.000159
18000.0	516.0	-13.8	-31.9	20.3	693.1	627.1	220.2	37.1	1.000157
18500.0	505.8	-15.1	-32.7	20.9	682.8	625.6	221.5	39.4	1.000154
19000.0	495.7	-16.4	-33.6	21.4	672.6	624.0	222.6	41.8	1.000152
19500.0	485.8	-17.8	-34.4	22.0	662.5	622.3	223.5	44.0	1.000149
20000.0	476.0	-19.1	-35.3	22.6	652.5	620.7	224.3	46.2	1.000147
20500.0	466.3	-20.0	-36.1	22.6	641.7	619.6	225.0	48.4	1.000145

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TABLE C-IV. UPPER AIR DATA - WHITE SANDS SITE (Cont)

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
21000.0	456.8	-20.4	-36.8	21.7	629.6	619.1	226.2	50.6	1.000142
21500.0	447.5	-20.7	-37.6	20.7	617.7	618.7	228.4	52.5	1.000139
22000.0	438.4	-21.3	-38.4	19.9	606.4	618.0	230.1	54.7	1.000136
22500.0	429.5	-22.3	-39.5	19.5	596.3	616.8	231.0	57.2	1.000134
23000.0	420.7	-23.3	-40.5	19.2	586.4	615.6	231.7	59.3	1.000132
23500.0	412.0	-24.2	-41.5	18.8	576.6	614.4	232.2	60.6	1.000129
24000.0	403.5	-25.2	-42.5	18.4	567.0	613.1	232.6	62.1	1.000127
24500.0	395.1	-26.2	-43.6	18.1	557.5	611.9	232.7	64.0	1.000125
25000.0	386.9	-27.3	-44.6	17.7	548.1	610.6	232.9	65.4	1.000123
25500.0	378.8	-28.3	-45.7	17.3	538.9	609.4	233.5	65.9	1.000121
26000.0	370.8	-29.3	-46.7	17.0	529.7	608.1	233.8	67.7	1.000119
26500.0	363.0	-30.3	-47.8	16.6	520.7	606.8	233.9	71.5	1.000116
27000.0	355.3	-31.3	-48.8	16.2	511.9	605.5	233.8	75.0	1.000114
27500.0	347.7	-32.3	-51.1	13.7**	503.0	604.3	233.4	78.3	1.000112
28000.0	340.3	-33.3	-56.0	8.4**	494.3	603.1	233.1	80.8	1.000110
28500.0	333.0	-34.3	-64.6	3.0**	485.7	601.8	232.6	82.7	1.000108
29000.0	325.8	-35.3	0.	-0. **	477.3	600.5	232.1	84.2	1.000106
29500.0	318.8	-36.4	0.	-0. **	469.2	599.1	231.5	85.6	1.000104
30000.0	311.9	-37.5	0.	-0. **	461.2	597.7	231.0	82.5	1.000103
30500.0	305.1	-38.7	0.	-0. **	453.3	596.2	230.6	77.3	1.000101
31000.0	298.4	-39.8	0.	-0. **	445.6	594.8	229.7	79.7	1.000099
31500.0	291.8	-41.0	0.	-0. **	437.9	593.3	228.6	85.4	1.000098
32000.0	285.3	-42.1	0.	-0. **	430.3	591.8	228.7	84.6	1.000096
32500.0	279.0	-43.3	0.	-0. **	422.9	590.4	229.3	80.7	1.000094
33000.0	272.8	-44.4	0.	-0. **	415.5	588.9	229.3	82.2	1.000093
33500.0	266.6	-45.6	0.	-0. **	408.3	587.4	228.8	86.7	1.000091
34000.0	260.6	-46.8	0.	-0. **	401.1	585.8	228.9	87.2	1.000089
34500.0	254.7	-48.0	0.	-0. **	394.1	584.3	229.3	84.5	1.000088
35000.0	248.9	-49.2	0.	-0. **	387.1	582.7	229.1	84.7	1.000086
35500.0	243.2	-50.4	0.	-0. **	380.3	581.1	228.3	88.1	1.000085
36000.0	237.5	-51.6	0.	-0. **	373.6	579.5	227.7	90.6	1.000083
36500.0	232.0	-52.8	0.	-0. **	367.0	577.9	227.5	91.6	1.000082
37000.0	226.6	-54.1	0.	-0. **	360.4	576.3	227.4	92.3	1.000080

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TABLE C-IV. UPEER AIR DATA - WHITE SANDS SITE (Cont)

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT DEGREES CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
37500.0	221.3	-55.3	0.	-0. **	354.0	574.7	227.5	91.8	1.000079
38000.0	216.1	-56.6	0.	-0. **	347.6	573.0	227.6	91.2	1.000077
38500.0	211.0	-57.8	0.	-0. **	341.4	571.4	228.2	91.7	1.000076
39000.0	205.9	-59.1	0.	-0. **	335.2	569.7	228.9	92.1	1.000075
39500.0	201.0	-60.1	0.	-0. **	328.6	568.4	229.8	91.4	1.000073
40000.0	196.2	-59.9	0.	-0. **	320.5	568.6	230.8	90.2	1.000071
40500.0	191.5	-59.7	0.	-0. **	312.6	568.8	231.6	86.2	1.000070
41000.0	186.9	-59.6	0.	-0. **	304.8	569.1	232.2	80.1	1.000068
41500.0	182.4	-59.4	0.	-0. **	297.3	569.3	232.7	76.1	1.000066
42000.0	178.0	-59.2	0.	-0. **	290.0	569.5	232.9	74.2	1.000065
42500.0	173.8	-59.1	0.	-0. **	282.8	569.7	233.2	72.9	1.000063
43000.0	169.6	-58.9	0.	-0. **	275.8	569.9	233.8	72.8	1.000061
43500.0	165.6	-58.7	0.	-0. **	269.0	570.1	234.4	72.8	1.000060
44000.0	161.6	-58.7	0.	-0. **	262.5	570.3	235.2	73.5	1.000058
44500.0	157.7	-59.2	0.	-0. **	256.9	569.5	236.0	74.3	1.000057
45000.0	154.0	-59.8	0.	-0. **	251.5	568.7	237.3	70.9	1.000056
45500.0	150.3	-60.4	0.	-0. **	246.1	567.9	238.7	66.5	1.000055
46000.0	146.6	-61.0	0.	-0. **	240.8	567.2	240.0	61.9	1.000054
46500.0	143.1	-61.6	0.	-0. **	235.7	566.4	241.2	57.3	1.000052
47000.0	139.6	-60.9	0.	-0. **	229.2	567.3	242.0	53.9	1.000051
47500.0	136.3	-60.1	0.	-0. **	222.9	568.3	241.4	55.5	1.000050
48000.0	133.0	-59.3	0.	-0. **	216.8	569.4	240.8	57.0	1.000048
48500.0	129.8	-59.8	0.	-0. **	212.0	568.8	239.8	60.0	1.000047
49000.0	126.7	-60.8	0.	-0. **	207.9	567.4	238.8	63.3	1.000046
49500.0	123.7	-61.8	0.	-0. **	203.9	566.1	237.9	65.7	1.000045
50000.0	120.7	-62.8	0.	-0. **	199.9	564.7	237.5	66.1	1.000045
50500.0	117.7	-63.8	0.	-0. **	196.0	563.3	237.1	66.5	1.000044
51000.0	114.8	-64.9	0.	-0. **	192.1	562.0	237.2	63.9	1.000043
51500.0	112.0	-65.9	0.	-0. **	188.3	560.6	237.4	59.9	1.000042
52000.0	109.3	-65.4	0.	-0. **	183.3	561.2	237.6	55.8	1.000041
52500.0	106.6	-65.0	0.	-0. **	178.4	561.8	236.8	49.6	1.000040
53000.0	103.9	-65.2	0.	-0. **	174.2	561.5	235.9	43.3	1.000039
53500.0	101.4	-66.5	0.	-0. **	170.9	559.7	233.9	37.4	1.000038

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TABLE C-IV. UPPER AIR DATA - WHITE SANDS SITE (Cont)

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
54000.0	98.9	-66.7	0.	-0. **	166.9	559.5	229.5	32.8	1.000037
54500.0	96.4	-66.7	0.	-0. **	162.7	559.5	225.0	28.1	1.000036
55000.0	94.0	-66.7	0.	-0. **	158.7	559.5	220.8	27.0	1.000035
55500.0	91.7	-66.7	0.	-0. **	154.8	559.5	216.7	26.7	1.000034
56000.0	89.4	-66.7	0.	-0. **	150.9	559.5	216.3	27.2	1.000034
56500.0	87.2	-66.7	0.	-0. **	147.2	559.5	218.9	28.3	1.000033
57000.0	85.1	-66.7	0.	-0. **	143.6	559.5	222.8	29.8	1.000032
57500.0	83.0	-65.8	0.	-0. **	139.4	560.7	227.9	31.7	1.000031
58000.0	80.9	-64.0	0.	-0. **	134.8	563.1	231.5	31.6	1.000030
58500.0	79.0	-62.3	0.	-0. **	130.5	565.4	233.3	29.2	1.000029
59000.0	77.0	-62.8	0.	-0. **	127.6	564.7	234.6	26.7	1.000028
59500.0	75.2	-63.3	0.	-0. **	124.8	564.1	232.2	23.3	1.000028
60000.0	73.3	-63.8	0.	-0. **	122.0	563.4	229.7	20.0	1.000027
60500.0	71.5	-64.3	0.	-0. **	119.3	562.8	224.7	18.3	1.000027
61000.0	69.8	-64.6	0.	-0. **	116.6	562.3	216.5	18.9	1.000026
61500.0	68.1	-64.2	0.	-0. **	113.5	562.9	208.3	19.4	1.000025
62000.0	66.4	-63.7	0.	-0. **	110.5	563.5	203.1	20.0	1.000025
62500.0	64.8	-63.2	0.	-0. **	107.6	564.2	199.3	20.7	1.000024
63000.0	63.2	-62.8	0.	-0. **	104.7	564.8	195.5	21.3	1.000023
63500.0	61.7	-62.3	0.	-0. **	102.0	565.4	186.3	17.9	1.000023
64000.0	60.2	-61.8	0.	-0. **	99.3	566.0	176.5	13.9	1.000022
64500.0	58.8	-61.4	0.	-0. **	96.7	566.7	167.2	10.3	1.000022
65000.0	57.3	-60.9	0.	-0. **	94.1	567.3	161.0	8.4	1.000021
65500.0	56.0	-60.4	0.	-0. **	91.7	567.9	154.8	6.5	1.000020
66000.0	54.6	-60.0	0.	-0. **	89.3	568.5	136.7	6.2	1.000020
66500.0	53.3	-59.5	0.	-0. **	86.9	569.1	101.2	8.3	1.000019
67000.0	52.0	-59.0	0.	-0. **	84.7	569.8	65.8	10.4	1.000019
67500.0	50.8	-58.6	0.	-0. **	82.5	570.4	54.9	10.7	1.000018
68000.0	49.6	-58.1	0.	-0. **	80.4	571.0	56.2	10.2	1.000018
68500.0	48.4	-57.7	0.	-0. **	78.3	571.6	57.1	10.4	1.000017
69000.0	47.3	-57.2	0.	-0. **	76.3	572.2	54.5	18.2	1.000017
69500.0	46.1	-57.2	0.	-0. **	74.5	572.2	51.8	26.0	1.000017
70000.0	45.1	-57.4	0.	-0. **	72.8	571.9	53.9	24.2	1.000016

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ASCENSION NO. 292

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TABLE C-IV. UPPER AIR DATA - WHITE SANDS SITE (Cont)

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
70500.0	44.0	-57.6	0.	-0. **	71.1	571.7	58.0	18.2	1.000016
71000.0	42.9	-57.8	0.	-0. **	69.5	571.4			1.000015
71500.0	41.9	-58.0	0.	-0. **	67.9	571.2			1.000015
72000.0	40.9	-58.1	0.	-0. **	66.3	571.0			1.000015
72500.0	40.0	-58.3	0.	-0. **	64.8	570.7			1.000014
73000.0	39.0	-58.5	0.	-0. **	63.3	570.5			1.000014
73500.0	38.1	-58.7	0.	-0. **	61.9	570.2			1.000014
74000.0	37.2	-58.9	0.	-0. **	60.4	570.0			1.000013
74500.0	36.3	-59.0	0.	-0. **	59.1	569.8			1.000013

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE OF ZERO WAS USED IN THE INTERPOLATION.

APPENDIX D

AEROBEE NASA 4.49 GS (S/N NASA 128-3)

IMPACT PREDICTION DATA

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D-I.	Impact Prediction Data- -	30

APPENDIX D

TABLE D-I

IMPACT PREDICTION DATA

MISSILE: AEROBEE NASA 4.49 GS (S/N NASA 128-3)

TIME: 0748 MST
DATE: 12 April 1965

RELEASE TIME (MST)		DISPLACEMENT OF IMPACT DUE TO WIND IN MILES				THEORETICAL IMPACT IN MILES	
RAWIN-SONDE	PIBAL	143 TO 2,000 FT	2,000 TO 20,000 FT	20,000 TO 100,000 FT	TOTAL	N-S OF LAUNCHER	E-W OF LAUNCHER
R_1 0200		1.3S	21.8S	18.9S	42.0S		
R 0200	P 0407	7.3E	17.4W	27.0W	37.1W	36.6N	6.4W
R_1 0200		0.2N	21.7S	18.9S	40.4S		
R 0200	P 0430	5.0E	16.1W	27.0W	38.1W	38.2N	7.4W
R_1 0400		0.8N	20.8S	18.9S	38.9S		
R 0200	P 0445	2.6E	15.8W	27.0W	40.2W	39.7N	9.5W
R_1 0400		2.1N	21.5S	18.9S	38.3S		
R 0200	P 0500	5.0E	16.3W	27.0W	38.3W	40.3N	7.6W
R_1 0400		1.9N	23.6S	18.9S	40.6S		
R 0200	P 0530	7.6E	18.2W	27.0W	37.6W	38.0N	6.9W
R_1 0400		7.2N	23.0S	16.7S	32.5S		
R 0400	P 0600	4.3E	18.1W	25.0W	38.8W	46.1N	8.1W
R_1 0400		12.1N	23.7S	16.7S	28.3S		
R 0400	P 0630	10.4E	17.8W	25.0W	32.4W	50.3N	1.7W
R_1 0400		14.6N	24.6S	16.7S	26.7S		
R 0400	P 0645	8.6E	18.1W	25.0W	34.5W	51.9N	3.8W
R_2 0630		19.0N	25.2S	16.7S	22.9S		
R 0400	P 0700	12.3E	16.3W	25.0W	29.0W	55.7N	1.7E
R_2 0630		15.4N	25.1S	16.7S	26.4S		
R 0400	P 0710	11.4E	14.7W	25.0W	28.3W	52.2N	2.4E
R_2 0630		20.4N	25.6S	16.7S	21.9S		
R 0400	P 0720	2.6E	14.7W	25.0W	37.1W	56.7N	6.4W
R_2 0630		14.8N	25.4S	16.7S	27.3S		
R 0400	P 0728	4.7E	14.9W	25.0W	35.2W	51.3N	4.5W
R_2 0630		11.1N	26.7S	16.7S	32.3S		
R 0400	P 0737	2.4E	14.7W	25.0W	37.3W	46.3N	6.6W
*R_1 0730		8.2N	29.1S	19.2S	40.1S		
*R 0730	*P 0750	1.9W	13.3W	23.8W	39.0W	38.5N	8.3W

P = Double Theodolite Winds (143-4,000 Ft)
R = Rawinsonde Winds (Above 20,000 Ft)
R_1 = Rawinsonde Winds (4,000-20,000 Ft)
R_2 = Rawin Winds (4,000-20,000 Ft)
* Post-Shoot Data

APPENDIX D

TABLE D-I (Cont)

IMPACT PREDICTION DATA

AEROBEE NASA 4.49 GS SERIAL NO. NASA 128-3

JACK SETTINGS

West leg 47 inches East leg 27 inches

LAUNCHER SETTING

Tilt 4.50 degrees Azimuth 025.1 degrees

COMPONENTS OF TILT

4.10 degrees north 1.91 degrees east

NO WIND IMPACT

78.6 miles north of Navy Blockhouse 30.7 miles east of Navy Blockhouse

PREDICTED IMPACT

50 miles north of Navy Blockhouse 0 miles E-W of Navy Blockhouse

PREDICTED BOOSTER IMPACT

Azimuth 035 degrees Distance 2,180 feet

Recommendation Fire

With 85 % confidence of impacting on range, based upon:

wind correction 37 miles

one hour wind variability 11 miles

Date/Time 12 April 1965/0747 MST

Actual Impact (From Launcher) 58.3 miles north, 6.0 miles west (Radar)

Actual Booster Impact (From Launcher) N/A

U. S. ARMY ELECTRONICS RESEARCH AND DEVELOPMENT ACTIVITY
WHITE SANDS MISSILE RANGE
NEW MEXICO

FRANCISCO MEJIA-FLORES
LT COLONEL, SIGNAL CORPS
COMMANDING

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HEADQUARTERS
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May 1965

1. Data Report ERDA-309 has been prepared under the supervision of the Meteorological Support Division and is published for the information and guidance of all concerned.

2. Suggestions or criticisms relative to the form, contents, purpose, or use of this publication should be referred to the Commanding Officer, U. S. Army Electronics Research and Development Activity, ATTN: SELWS-E, White Sands Missile Range, New Mexico.

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